Multiplication And Division of Lines

1. An unit is that by virtue of which each of the things that exist is called one.
Euclid's Elements

312

The Basic figures in this little thing are written up in my work Threee Pieces of Paper, or The Delian Quest. This is not a formal presentation, is a presentation of craft basics.

John Clark

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Printed via import to MS Word.

Following the Yellow Brick Road

Multiplication

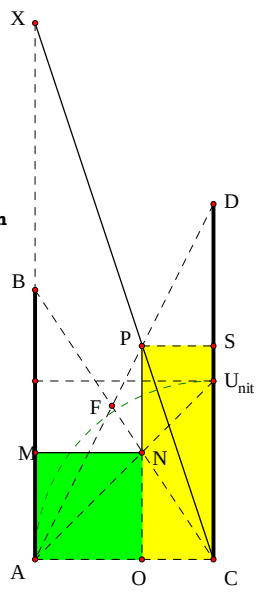
Unit = 1.00000

AB = 1.51095

CD = 1.99270

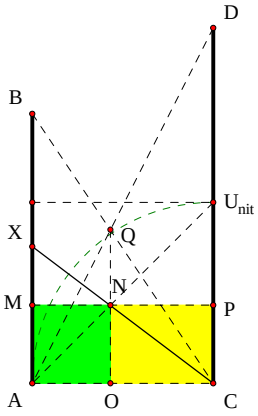
AX = 3.01087

AB·CD-AX = 0.00000



$$\frac{\text{(Area } \triangle\text{BAC)}}{\text{(Area } \triangle\text{ADC)}} - \frac{\text{(Area MNOA)}}{\text{(Area OPSC)}} = 0.00000$$

In Ancient Geometry, one calls the Green Square Numbers, and one calls the yellow Oblong Numbers. Today we just do swatches.



$$\frac{\text{(Area MAON)}}{\text{(Area NOCP)}} - \frac{\text{(Area } \triangle\text{BAC)}}{\text{(Area } \triangle\text{ADC)}} = 0.00000$$

Division

Unit = 1.00000

AB = 1.48921

CD = 1.96403

AX = 0.75824

$$\frac{\text{AB}}{\text{CD}} - \text{AX} = 0.00000$$

Introduction

Maybe I am too dogmatic, but I think one should have geometry teach one something of basic math. One should be able to add, subtract, multiply and divide with lines. These can provide proofs and constructible.

The figures can be modified in various ways to produce various results. I present a few here. The main figure is composed of the notion of common unit, and that multiplication and division works with square numbers, which is distinct from squaring a number. The square thus constructed provides the properties needed for multiplication and division.

I once read, in an Algebra book, that exponential notation had nothing to do with Geometry, that it was a pure mental abstract. What am I, then, to do with all the figures I have come up with that display the principles?

I would also like to see how the four basic operations of Math hold up in "non-Euclidean" Geometries. In fact, as part of their presentation, I think the four basic operations of mathematics should be a requirement. Perhaps by teaching the remaining two in geometry, something about reality and standards of thought will be learned.

The material in this little flyer is not new to me, it is part of four works I am currently engaged in, The Delian Quest, which is essentially completed, it needs some lipstick and a dress, Three Pieces of Paper, Eloi, and something with a puny Latin name.

Oh, and no, I have never studied geometry in an institution-I have never seen ideas survive in an institution. I have and probably will be again, be institutionalized at my own request.

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Function	Page
$(N_1 \cdot N_2) - N_3 = 0.00000$	Link to 1
$\frac{N_1}{N_2} = 1.13725$ $\frac{N_1+N_2}{N_1} = 1.87931$ $\frac{N_1+N_2}{N_2} = 2.13725$	Link to 2
$\frac{1}{N_1} - N_3 = 0.00000$	Link to 3
$\frac{N_1}{N_2^2} - N_4 = 0.00000$ $\frac{N_1}{N_2^3} - N_5 = 0.00000$	Link to 4
$2 \cdot N_1 \cdot N_2 - N_1 - N_4 = 0.00000$	Link to 5
$\frac{N_1^2}{(N_2+N_1) \cdot N_2} - N_3 = 0.00000$	Link to 6
$(2 \cdot N_1 \cdot N_2 + N_1^2 \cdot N_2) - N_3 = 0.00000$	Link to 7
$N_3^2 - \frac{BC}{BD} = 0.00000$ $N_3^3 - \frac{BC}{BE} = 0.00000$ $N_3^4 - \frac{BC}{BF} = 0.00000$	Link to 8
$\frac{N4_2}{N2_2} = 1.39420$ $\frac{N2_2}{N1_2} = 1.39420$ $\frac{N1_2}{Unit_2} = 1.39420$ $\frac{Unit_2}{N3_2} = 1.39420$	Link to 9
$\frac{N_1^2}{N_2} - N_5 = 0.00000$ $\frac{N_1^3}{N_2^2} - N_6 = 0.00000$ $\frac{N_2^2}{N_1} - N_7 = 0.00000$	Link to 10

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Function	Page
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$\sqrt{2} - N_5 = 0.00000$ $\frac{\sqrt{2} \cdot N_1}{N_2} - N_6 = 0.00000$ $\frac{N_1 \cdot N_2}{\sqrt{2}} - N_7 = 0.00000$	Link to 12
$N_5 - 2^{0.75} = 0.00000$ $\left(\frac{N_1}{N_2}\right) \cdot N_5 - N_6 = 0.00000$ $\frac{N_1 \cdot N_2}{N_5} - N_7 = 0.00000$	Link to 13
$N_1^{0.5} - N_2 = 0.00000$ $N_1^{0.25} - N_3 = 0.00000$ $N_1^{0.125} - N_4 = 0.00000$	Link to 14
$\frac{N_1^{0.5}}{N_2^{0.5}} - N_3 = 0.00000$ $\frac{N_1^{0.25}}{N_2^{0.75}} - N_4 = 0.00000$ $N_1^{0.5} \cdot N_2^{1.5} - N_5 = 0.00000$	Link to 15
$\frac{N_1^2}{(N_1+N_2) \cdot N_2} - L_1 = 0.00000$ $\frac{N_1^2 \cdot N_2}{N_1+N_2} - M_1 = 0.00000$	Link to 16
$\frac{N_1^2}{N_2 \cdot (N_1+1)} - L_1 = 0.00000$ $\frac{N_1^2 \cdot N_2}{N_1+1} - M_1 = 0.00000$	Link to 17
$\frac{N_1^2}{N_2^4} - N_7 = 0.00000$ $N_2^4 - N_8 = 0.00000$ $N_2^3 - N_{25} = 0.00000$	Link to 18
$\frac{N_2^4}{N_1} - N_{26} = 0.00000$ $\frac{N_1}{N_2} - N_{27} = 0.00000$ $\frac{N_2^7}{N_1} - N_8 = 0.00000$	

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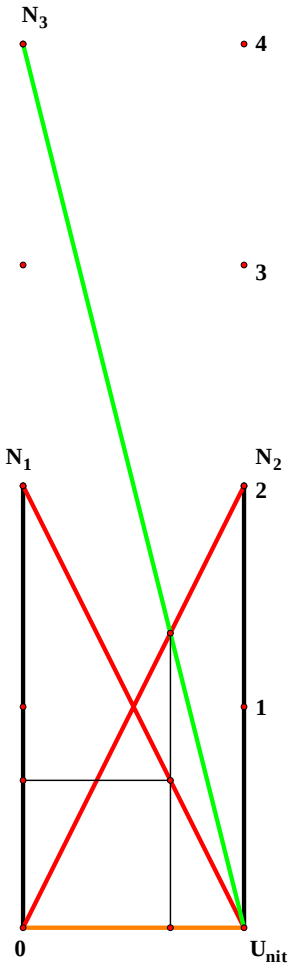
Function	Page	Function	Page
$N_1 \cdot N_2 \cdot \left(\frac{1}{3}\right) - N_9 = 0.00000$ $\quad N_1 \cdot N_2 \cdot \left(\frac{2}{3}\right) - N_{10} = 0.00000$	Link to 19		
$N_1 \cdot \left(\frac{N_1}{N_1+N_2}\right) - N_5 = 0.00000$ $\quad N_1 \cdot \left(\frac{N_2}{N_1+N_2}\right) - N_6 = 0.00000$	Link to 20		
$N_1 \cdot N_2 \cdot \left(\frac{N_1}{N_1+N_2}\right) - N_7 = 0.00000$			
$N_1^{\frac{1}{2}} - N_2 = 0.00000$ $\quad N_1^{\frac{1}{4}} - N_3 = 0.00000$ $\quad N_1^{\frac{1}{8}} - N_4 = 0.00000$	Link to 21		
$N_1^{\frac{8}{8}} - N_1 = 0.00000$ $\quad N_1^{\frac{7}{8}} - N_2 = 0.00000$ $\quad N_1^{\frac{6}{8}} - N_3 = 0.00000$	Link to 22		
$N_1^{\frac{5}{8}} - N_4 = 0.00000$ $\quad N_1^{\frac{4}{8}} - N_5 = 0.00000$ $\quad N_1^{\frac{3}{8}} - N_6 = 0.00000$			
$N_1^{\frac{2}{8}} - N_7 = 0.00000$ $\quad N_1^{\frac{1}{8}} - N_8 = 0.00000$ $\quad N_1^{\frac{0}{8}} - N_0 = 0.00000$			



$N_1 = 2.00000$

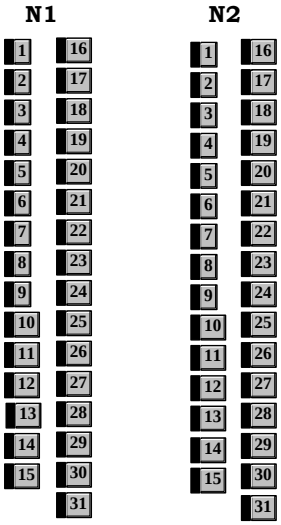
$N_2 = 2.00000$

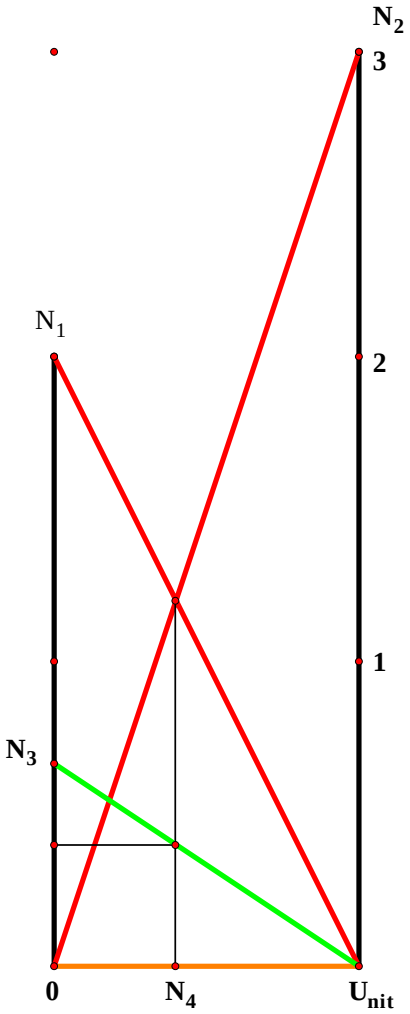
$N_1 \cdot N_2 = 4.00000$

$(N_1 \cdot N_2) - N_3 = 0.00000$

$N_3 = 4.00000$

Multiply N1 by N2





$N_1 = 2.00000$

$N_2 = 3.00000$

$\frac{N_1}{N_2} = 0.66667$

$N_3 = 0.66667$

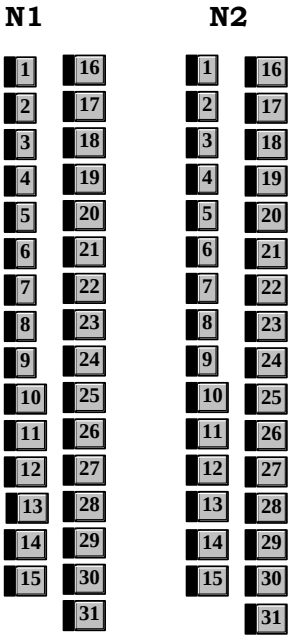
$\frac{U_{nit}}{0N_4} = 2.50000$

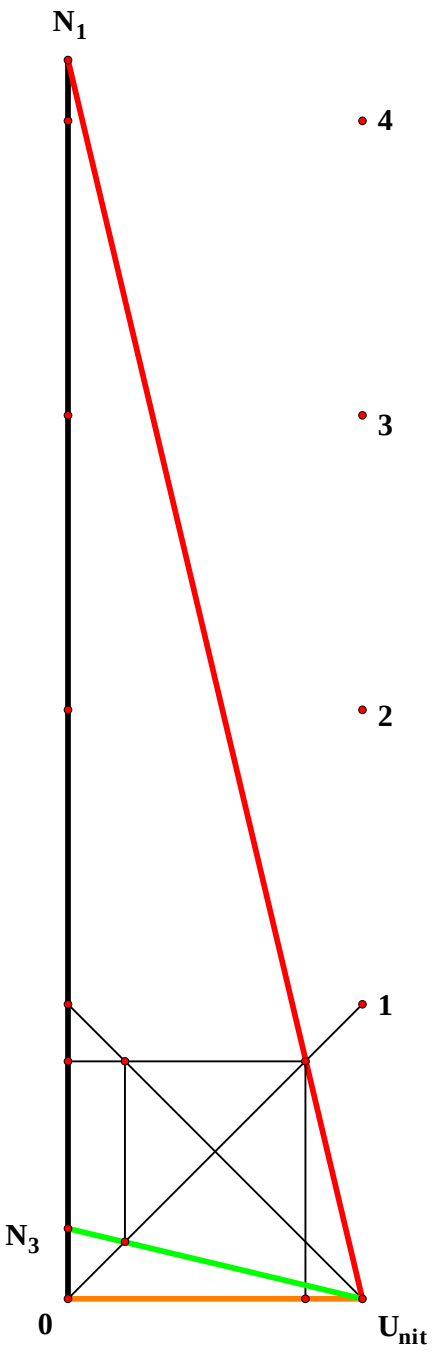
$\frac{N_1+N_2}{N_1} = 2.50000$

$\frac{U_{nit}}{U_{nit}N_4} = 1.66667$

$\frac{N_1+N_2}{N_2} = 1.66667$

Divide
N1 by N2





$N_1 = 4.20930$

$\frac{1}{N_1} = 0.23757$

$N_3 = 0.23757$

$\frac{1}{N_1} - N_3 = 0.00000$

Find the Recprocal N1

N1

1	16
2	17
3	18
4	19
5	20
6	21
7	22
8	23
9	24
10	25
11	26
12	27
13	28
14	29
15	30
	31

$N_1 = 3.00000$

$N_2 = 2.00000$

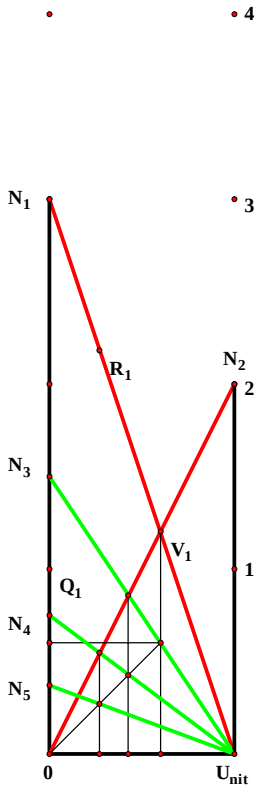
$\frac{N_1}{N_2} = 1.50000$

$N_3 = 1.50000$

$N_4 = 0.75000$ $\quad \frac{N_1}{N_2^2} - N_4 = 0.00000$

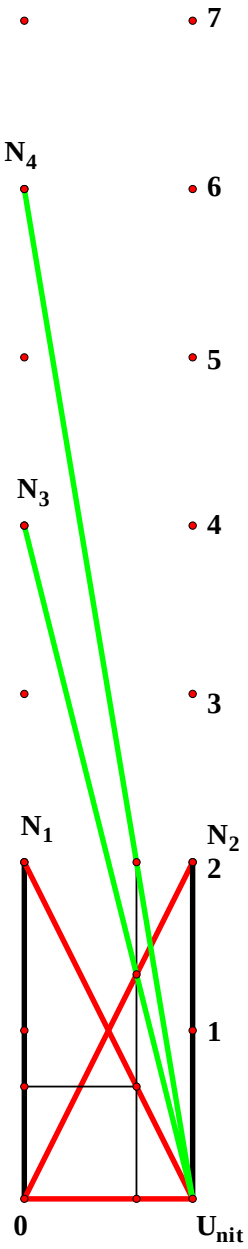
$N_5 = 0.37500$ $\quad \frac{N_1}{N_2^3} - N_5 = 0.00000$

etc.



Divide N1 by a Power of N2

N1			N2	
1	16		1	16
2	17		2	17
3	18		3	18
4	19		4	19
5	20		5	20
6	21		6	21
7	22		7	22
8	23		8	23
9	24		9	24
10	25		10	25
11	26		11	26
12	27		12	27
13	28		13	28
14	29		14	29
15	30		15	30
	31			31



$N_1 = 2.00000$

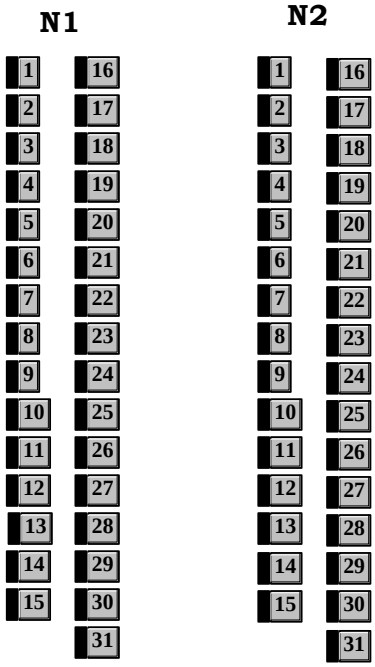
$N_2 = 2.00000$

$N_1 \cdot N_2 = 4.00000$

$N_3 = 4.00000$

$N_4 = 6.00000$

$2 \cdot N_1 \cdot N_2 - N_1 - N_4 = 0.00000$



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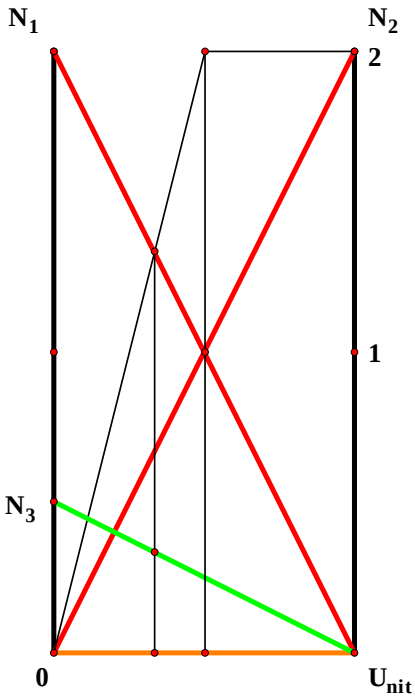


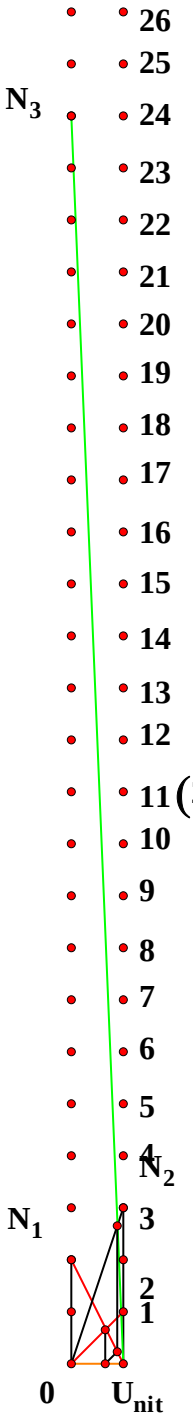
$N_1 = 2.00000$

$N_2 = 2.00000$

$N_3 = 0.50000$

$$\frac{N_1^2}{(N_2+N_1)\cdot N_2} - N_3 = 0.00000$$

N1		N2	
1	16	1	16
2	17	2	17
3	18	3	18
4	19	4	19
5	20	5	20
6	21	6	21
7	22	7	22
8	23	8	23
9	24	9	24
10	25	10	25
11	26	11	26
12	27	12	27
13	28	13	28
14	29	14	29
15	30	15	30
	31		31

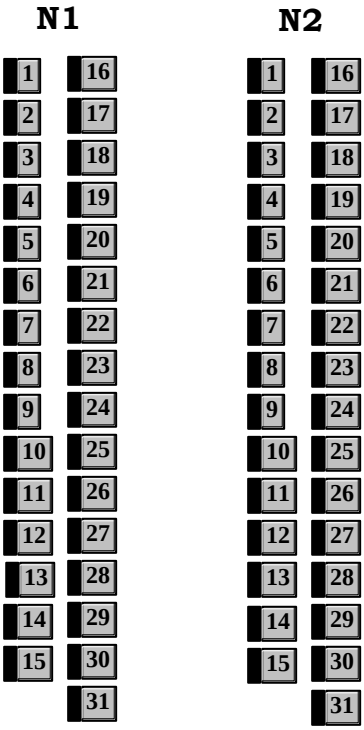


$N_1 = 2.00000$

$N_2 = 3.00000$

$N_3 = 24.00000$

$\left(2 \cdot N_1 \cdot N_2 + N_1^2 \cdot N_2\right) - N_3 = 0.00000$



$\frac{BC}{BV_1} = 0.81650$ $N_3^{-0.5} = 0.81650$

$N_3^{0} = 1.00000$

$\frac{BC}{BU_1} = 1.22474$ $N_3^{0.5} = 1.22474$

$\frac{BC}{BP_1} = 1.50000$

$\frac{BC}{BR_1} = 2.25000$ $N_3^{2} - \frac{BC}{BR_1} = 0.00000$

$\frac{BC}{BS_1} = 3.37500$ $N_3^{3} - \frac{BC}{BS_1} = 0.00000$

$\frac{BC}{BT_1} = 5.06250$ $N_3^{4} - \frac{BC}{BT_1} = 0.00000$

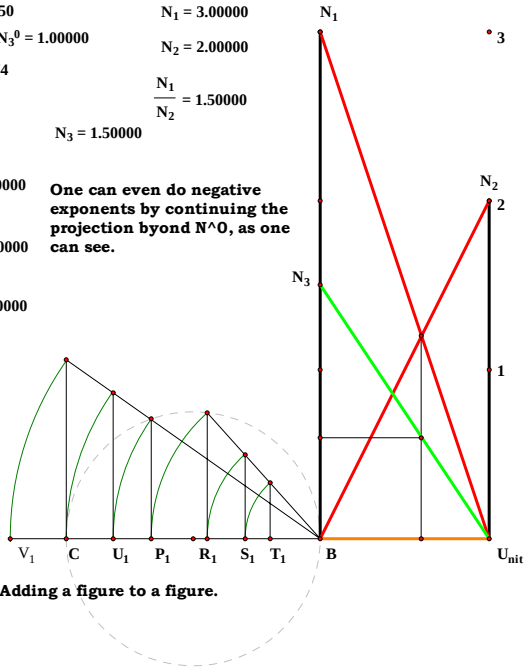
$N_1 = 3.00000$

$N_2 = 2.00000$

$\frac{N_1}{N_2} = 1.50000$

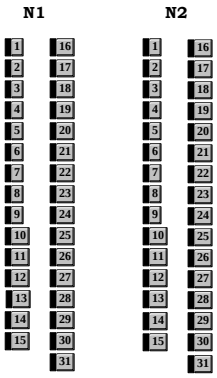
$N_3 = 1.50000$

One can even do negative exponents by continuing the projection byond N^0, as one can see.



Adding a figure to a figure.

I tossed this together, so it is not perfect--it just looks good



How to find a Proportional Unit for a given pair of Magnitudes

$Unit_2 = 1.00000$

$N1_2 = 1.39420$

$N2_2 = 1.94380$

$N3_2 = 0.71726$

$N4_2 = 2.71004$

$\frac{N1_2}{N2_2} - N3_2 = 0.00000$

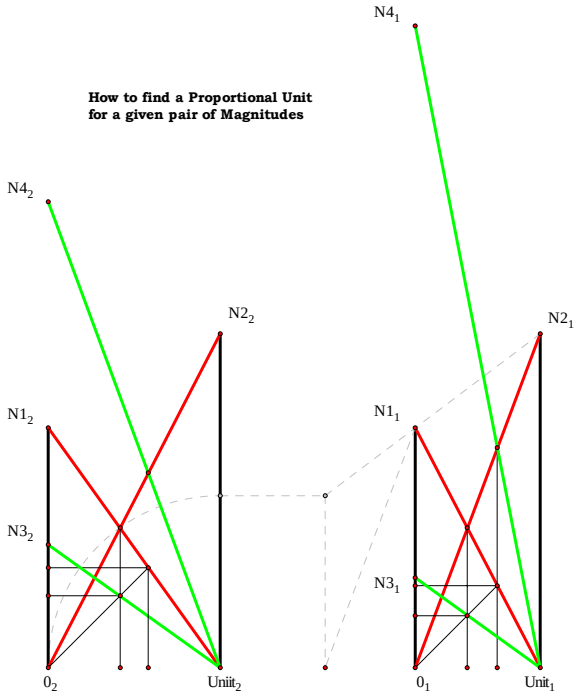
$N1_2 \cdot N2_2 - N4_2 = 0.00000$

$\frac{N4_2}{N2_2} = 1.39420$

$\frac{N2_2}{N1_2} = 1.39420$

$\frac{N1_2}{Unit_2} = 1.39420$

$\frac{Unit_2}{N3_2} = 1.39420$



$Unit_1 = 1.00000$

$N1_1 = 1.91861$

$N2_1 = 2.67492$

$N3_1 = 0.71726$

$N4_1 = 5.13213$

$\frac{N1_1}{N2_1} - N3_1 = 0.00000$

$N1_1 \cdot N2_1 - N4_1 = 0.00000$

$\frac{N4_1}{N2_1} = 1.91861$

$\frac{N2_1}{N1_1} = 1.39420$

$\frac{N1_1}{Unit_1} = 1.91861$

$\frac{Unit_1}{N3_1} = 1.39420$

Unit = 1.00000

$N_1 = 2.00000$

$N_2 = 3.00000$

$N_3 = 0.66667$

$N_4 = 6.00000$

$N_5 = 1.33333$

$N_6 = 0.88889$

$N_7 = 4.50000$

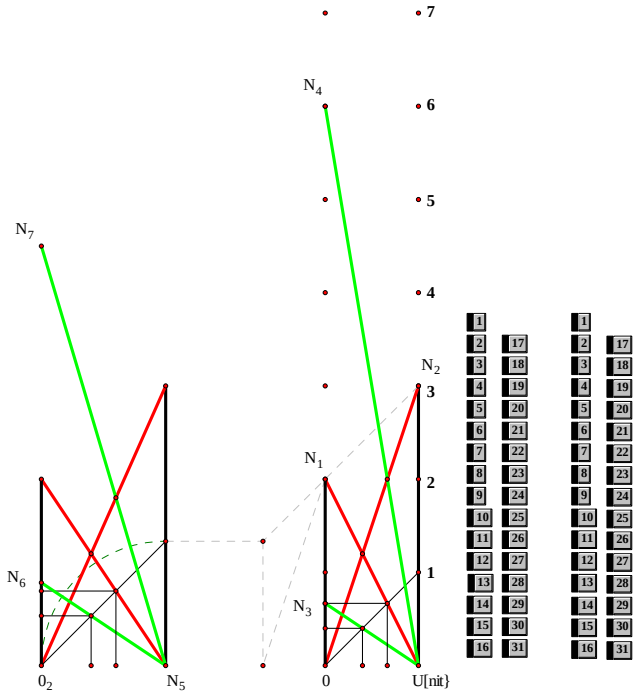
$\frac{N_1}{N_2} - N_3 = 0.00000$

$N_1 \cdot N_2 - N_4 = 0.00000$

$\frac{N_1^2}{N_2} - N_5 = 0.00000$

$\frac{N_1^3}{N_2^2} - N_6 = 0.00000$

$\frac{N_2^2}{N_1} - N_7 = 0.00000$



Unit = 1.00000

N_1 = 2.00000

N_2 = 2.30952

N_3 = 0.86598

N_4 = 4.61905

N_5 = 0.74992

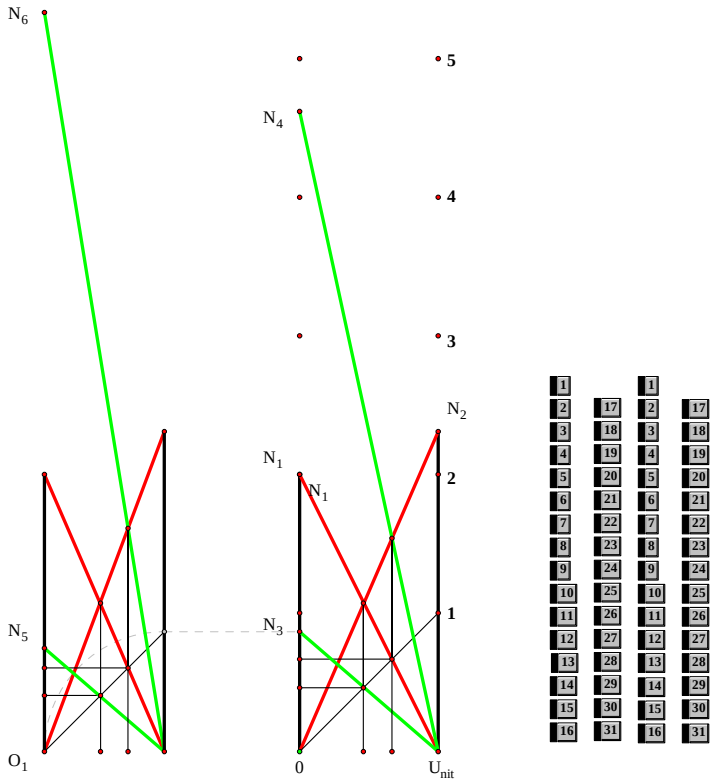
N_6 = 5.33390

$\frac{N_1}{N_2}$ **-N_3 = 0.00000**

$N_1 \cdot N_2 - N_4$ = 0.00000

$\frac{N_1^2}{N_2^2}$ **-N_5 = 0.00000**

$N_2^2 - N_6$ = 0.00000



Unit = 1.00000

$N_1 = 2.00000$

$N_2 = 2.43939$

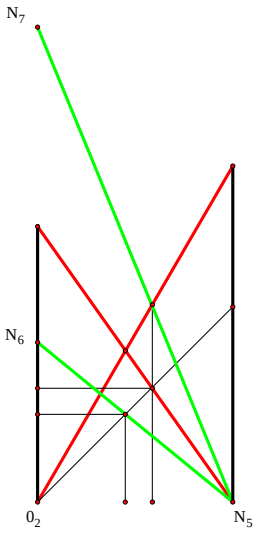
$N_3 = 0.81988$ $\quad \frac{N_1}{N_2} - N_3 = 0.00000$

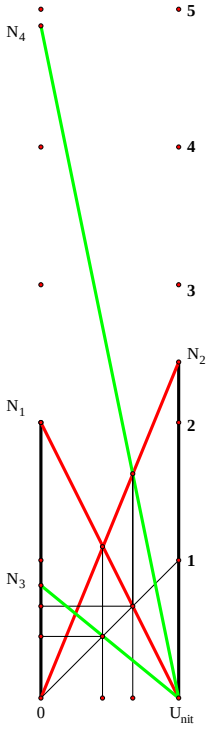
$N_4 = 4.87879$ $\quad N_1 \cdot N_2 - N_4 = 0.00000$

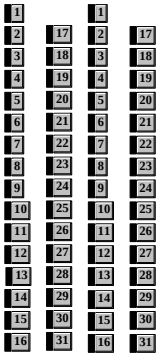
$N_5 = 1.41421$ $\quad \sqrt{2} - N_5 = 0.00000$

$N_6 = 1.15948$ $\quad \frac{\sqrt{2} \cdot N_1}{N_2} - N_6 = 0.00000$

$N_7 = 3.44982$ $\quad \frac{N_1 \cdot N_2}{\sqrt{2}} - N_7 = 0.00000$







Unit = 1.00000

N_1 = 2.00000

N_2 = 2.00000 $\quad \frac{N_1}{N_2} - N_3 = 0.00000$

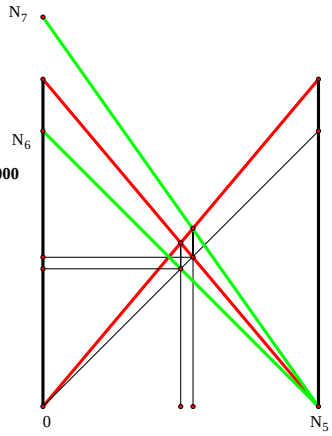
N_3 = 1.00000

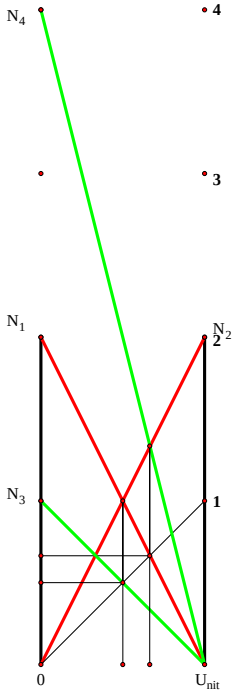
N_4 = 4.00000 $\quad N_1 \cdot N_2 - N_4 = 0.00000$

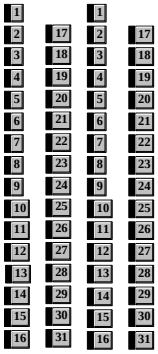
N_5 = 1.68179 $\quad N_5 - 2^{0.75} = 0.00000$

N_6 = 1.68179 $\quad \left(\frac{N_1}{N_2}\right) \cdot N_5 - N_6 = 0.00000$

N_7 = 2.37841 $\quad \frac{N_1 \cdot N_2}{N_5} - N_7 = 0.00000$







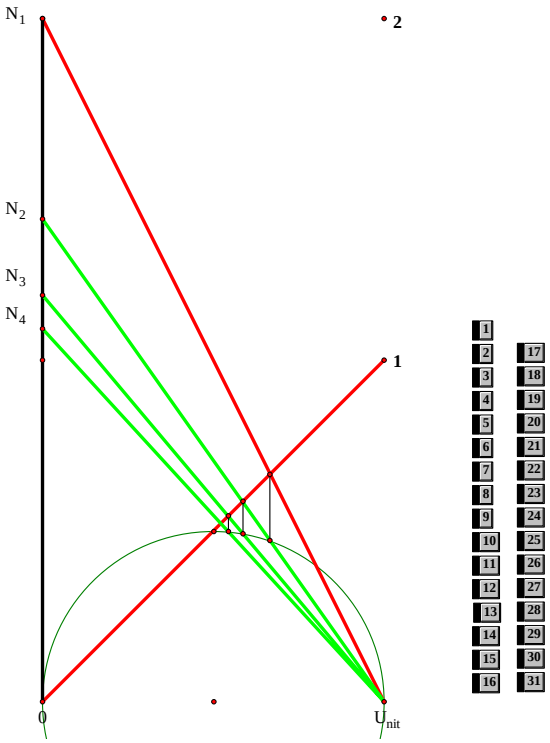
Unit = 1.00000

N_1 = 2.00000

N_2 = 1.41421 **$N_1^{0.5}-N_2$ = 0.00000**

N_3 = 1.18921 **$N_1^{0.25}-N_3$ = 0.00000**

N_4 = 1.09051 **$N_1^{0.125}-N_4$ = 0.00000**



Unit = 1.00000

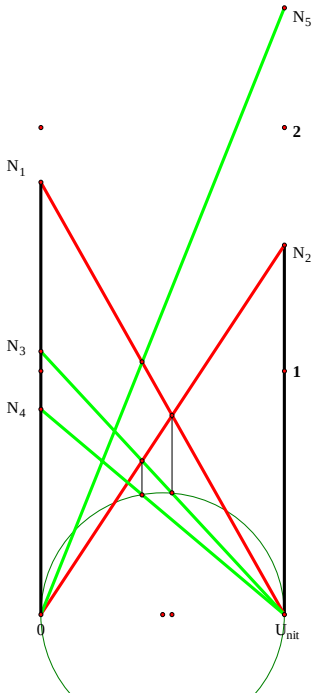
N_1 = 1.77542

N_2 = 1.51695

N_3 = 1.08185 $\quad \frac{N_1^{0.5}}{N_2^{0.5}} - N_3 = 0.00000$

N_4 = 0.84450 $\quad \frac{N_1^{0.25}}{N_2^{0.75}} - N_4 = 0.00000$

N_5 = 2.48947 $\quad N_1^{0.5} \cdot N_2^{1.5} - N_5 = 0.00000$



1	17	1	17
2	18	2	18
3	19	3	19
4	20	4	20
5	21	5	21
6	22	6	22
7	23	7	23
8	24	8	24
9	25	9	25
10	26	10	26
11	27	11	27
12	28	12	28
13	29	13	29
14	30	14	30
15	31	15	31
16		16	

Unit = 1.00000

N_1 = 1.00000

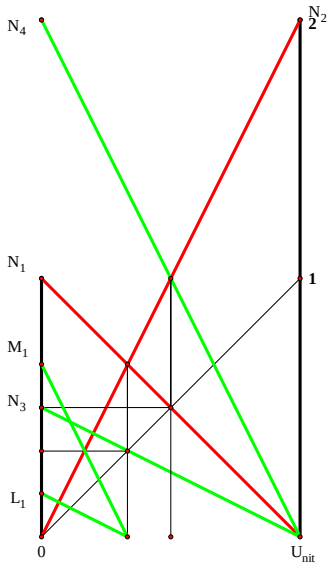
N_2 = 2.00000 $\frac{N_1}{N_2}-N_3 = 0.00000$

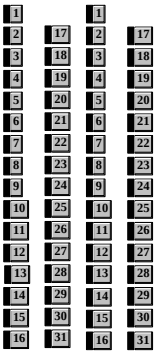
N_3 = 0.50000

N_4 = 2.00000 $N_1 \cdot N_2 - N_4 = 0.00000$

L_1 = 0.16667 $\frac{N_1^2}{(N_1+N_2)\cdot N_2}-L_1 = 0.00000$

M_1 = 0.66667 $\frac{N_1^2 \cdot N_2}{N_1+N_2}-M_1 = 0.00000$





Unit = 1.00000

N_1 = 2.00000

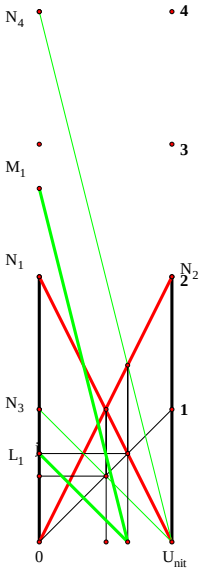
N_2 = 2.00000 $\frac{N_1}{N_2}$**-N_3 = 0.00000**

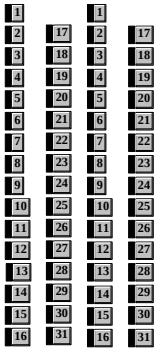
N_3 = 1.00000

N_4 = 4.00000 **$N_1 \cdot N_2 - N_4 = 0.00000$**

L_1 = 0.66667 $\frac{N_1^2}{N_2 \cdot (N_1+1)}$**-$L_1$ = 0.00000**

M_1 = 2.66667 $\frac{N_1^2 \cdot N_2}{N_1+1}$**-$M_1$ = 0.00000**





$U_1 = 1.00000$

$N_1 = 2.00000$

$N_2 = 2.00000$

$N_3 = 1.00000$ $\quad \frac{N_1}{N_2} = 1.00000$

$N_4 = 4.00000$ $\quad N_1 \cdot N_2 - N_4 = 0.00000$

$U[1] / U_2 = 0.25000$

$N_5 = 2.00000$

$N_6 = 2.00000$

$N_7 = 0.25000$ $\quad \frac{N_1^2}{N_2^4} - N_7 = 0.00000$

$N_8 = 16.00000$ $\quad N_2^4 - N_8 = 0.00000$

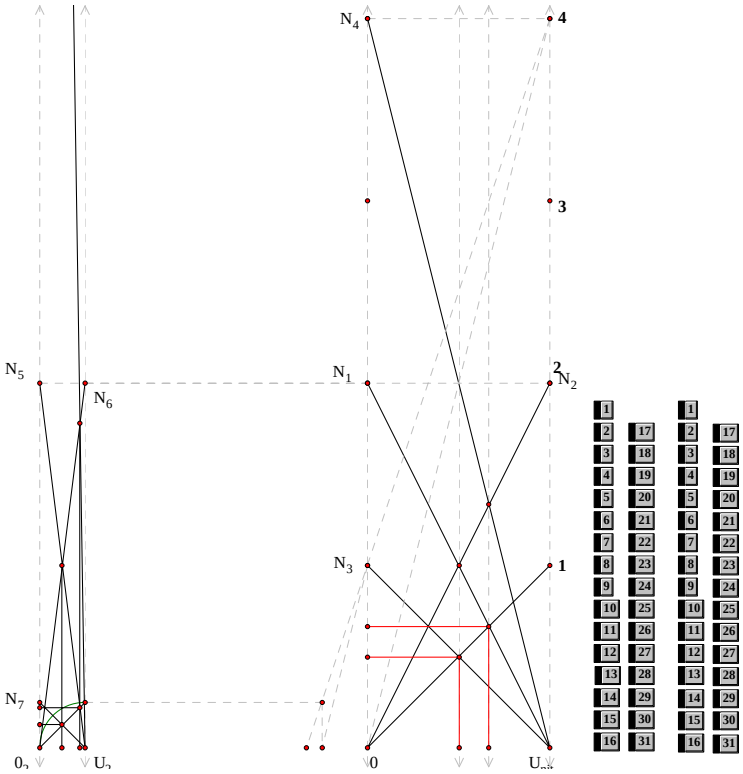
$U_2 = 1.00000$

$N_{25} = 8.00000$ $\quad N_2^3 - N_{25} = 0.00000$

$N_{26} = 8.00000$ $\quad \frac{N_2^4}{N_1} - N_{26} = 0.00000$

$N_{27} = 1.00000$ $\quad \frac{N_1}{N_2} - N_{27} = 0.00000$

$N_8 = 64.00000$ $\quad \frac{N_2^7}{N_1} - N_8 = 0.00000$



Unit = 1.00000

N_1 = 1.72159 $\quad \frac{N_1}{N_2} - N_3 = 0.00000$

N_2 = 2.12500 $\quad N_1 \cdot N_2 - N_4 = 0.00000$

N_3 = 0.81016 $\quad \frac{N_1}{N_2} = 0.81016$

N_4 = 3.65838

N_5 = 0.57386

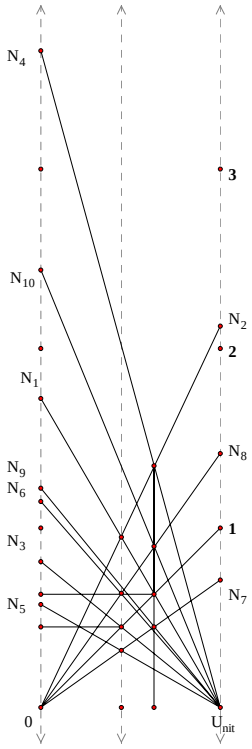
N_6 = 1.14773

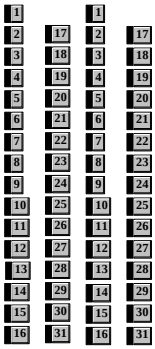
N_7 = 0.70833

N_8 = 1.41667

N_9 = 1.21946 $\quad N_1 \cdot N_2 \cdot \left(\frac{1}{3}\right) - N_9 = 0.00000$

N_{10} = 2.43892 $\quad N_1 \cdot N_2 \cdot \left(\frac{2}{3}\right) - N_{10} = 0.00000$





Unit = 1.00000

N_1 = 1.37056

N_2 = 1.73096

N_3 = 0.79179 $\frac{N_1}{N_2} = 0.79179$

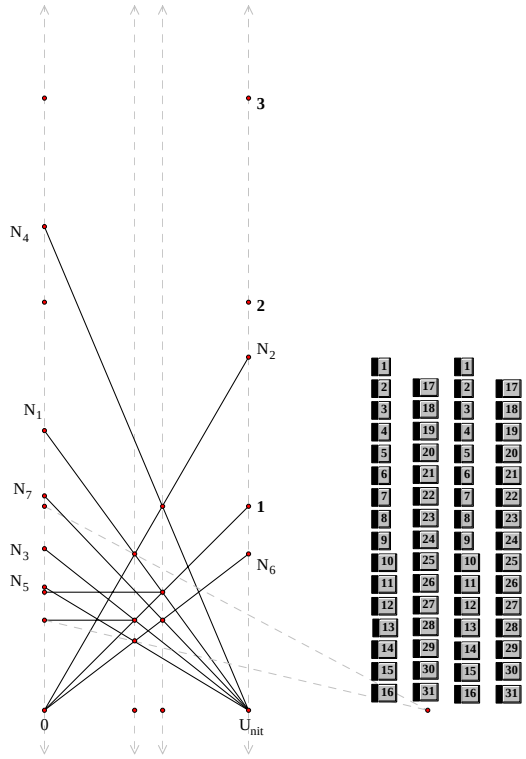
N_4 = 2.37239 $N_1 \cdot N_2 = 2.37239$

$\frac{N_1}{N_2} = 0.79179$

N_5 = 0.60565 $N_1 \cdot \left(\frac{N_1}{N_1+N_2} \right) - N_5 = 0.00000$

N_6 = 0.76491 $N_1 \cdot \left(\frac{N_2}{N_1+N_2} \right) - N_6 = 0.00000$

N_7 = 1.04835 $N_1 \cdot N_2 \cdot \left(\frac{N_1}{N_1+N_2} \right) - N_7 = 0.00000$



Unit = 1.00000

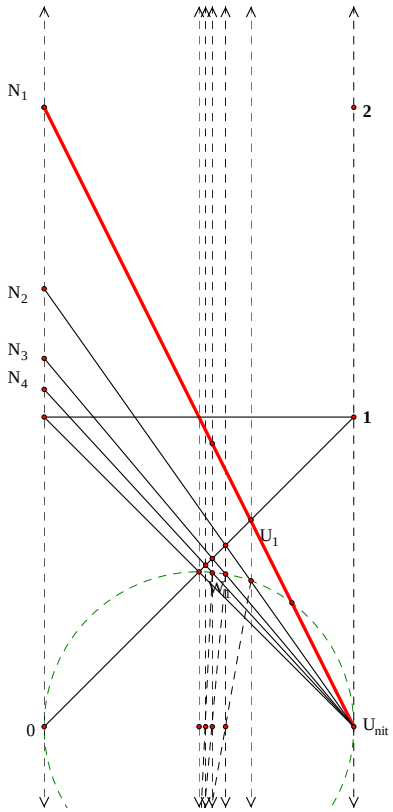
N_1 = 2.00000

N_2 = 1.41421 $\quad N_1^{\frac{1}{2}} - N_2 = 0.00000$

N_3 = 1.18921 $\quad N_1^{\frac{1}{4}} - N_3 = 0.00000$

N_4 = 1.09051 $\quad N_1^{\frac{1}{8}} - N_4 = 0.00000$

etc.



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

Unit = 1.00000

N_1 = 2.00000 $N_1^{\frac{8}{8}} - N_1 = 0.00000$

N_2 = 1.83401 $N_1^{\frac{7}{8}} - N_2 = 0.00000$

N_3 = 1.68179 $N_1^{\frac{6}{8}} - N_3 = 0.00000$

N_4 = 1.54221 $N_1^{\frac{5}{8}} - N_4 = 0.00000$

N_5 = 1.41421 $N_1^{\frac{4}{8}} - N_5 = 0.00000$

N_6 = 1.29684 $N_1^{\frac{3}{8}} - N_6 = 0.00000$

N_7 = 1.18921 $N_1^{\frac{2}{8}} - N_7 = 0.00000$

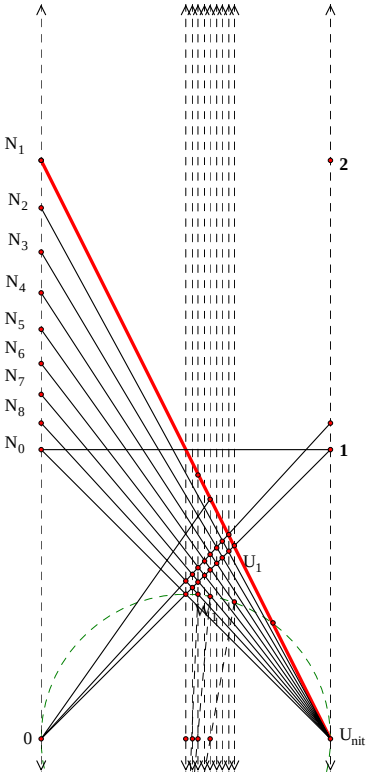
N_8 = 1.09051 $N_1^{\frac{1}{8}} - N_8 = 0.00000$

N_0 = 1.00000 $N_1^{\frac{0}{8}} - N_0 = 0.00000$

etc.

Eight root series.

One can project as long as they like.



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

The computational speed by straight edge and compass outdoes long hand by factors. The computational accuracy exceeds that of any binary computer. The understanding as to what numbers mean cannot be outdone. Yet, instead of improving Euclid, they made a mess of it.

What led me to this solution was not Euclid, it was my own geometry play-especially doing the formula's and solution to a power line In order to solve for the power line, I actually had to know how to divide a square by a line. That coupled with the feeling that one should know the basic mathematical operations in geometry, as a starter made me break down and simply do it.

Geometry is still undefined. It is undefined because, as we know, a set can be constructed in only two ways, by enumeration and by definition. By saying that Euclidean Geometry only uses two tools, the straight edge and compass, we have enumerated its set. To define it, one would have to say, Geometry is that language by which we speak where there is one, and only one difference between two points.

This change not only defines Euclidean Geometry, but we find that it has been short changed for a long time. A straight edge does indeed give us one and only one difference between two points, and so does a compass, these are the unit and universe of discourse in the subject. However, there is yet one more tool, that tool that gives us every ratio in-between the unit and the universe, the ellipes. There is indeed one and only one difference between the two points called the foci of an ellipse.

If one can accept that, one can then understand my solution to the Delian Problem. A figure that gives one every aspect of an ellipse and one simply has to lay it down. Accepting that definition also takes something that is implied in Euclidean Geometry and makes it explicit, the ability to add, to do the math.

I hope you have fun.